NY/NJ Coastal Restudy Meeting

Community Meeting #2
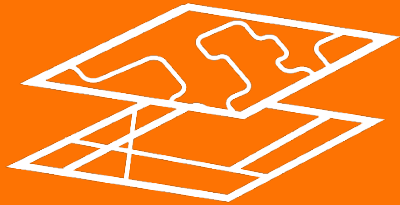
Today's Goals
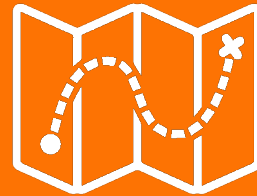
1 Coastal Restudy Overview

2 Latest Coastal Restudy Milestones

3 Opportunities for Collaboration

FEMA

Introductions – FEMA and State Agencies

|	Title	Employee	Phone Number
FEMA	RII Risk Analysis – Acting Branch Chief	Michael P. Foley michael.foley3@fema.dhs.gov	(212) 680-3634
	RII Risk Analysis – Project Monitor (NJ, NYC)	Robert Schaefer Robert.Schaefer@fema.dhs.gov	(212) 680-8808
	RII Risk Analysis – Project Monitor (Westchester)	Alan Springett Alan.Springett@fema.dhs.gov	(212) 680-8557
	RII Risk Analysis – Civil Engineer	Shudipto Rahman Shudipto.Rahman@fema.dhs.gov	(202) 702-4273
	RII Mitigation Division – Resiliency Specialist	Thomas Song, CFM Thomas.Song@fema.dhs.gov	(917) 374-5475
NYSDEC / NJDEP	NYSDEC NY State NFIP Coordinator's Office	Kelli Higgins-Roche kelli.higgins-roche@dec.ny.gov	(518) 402-8280
	NJDEP NJ State NFIP Coordinator's Office	Joe Ruggieri Joseph.Ruggieri@dep.nj.gov	(609) 292-2296

FEMA

Introductions – Project Support

	Title	Employee	Phone Number
Project Management	Floodplain Analysis and Mapping – Compass (Coastal Update, Storm Surge, and NJ and NYC Overland)	Jeff Smith, P.E., PMP, CFM jeff.r.smith@aecom.com	(215) 789-2166
	Floodplain Analysis and Mapping – STARR II (Westchester Overland)	Mike Salisbury, P.E. michael.salisbury@atkinsglobal.com	(321) 775-6650
Regional Support Center	Planner – STARR II	Rosemary Bolich, AICP, CFM Rosemary.Bolich@Stantec.com	(646) 490-3848
	Water Resources Engineer – STARR II	Trevor Cone Trevor.Cone@Stantec.com	(212) 330-6157
Outreach	Community Engagement and Risk Communication – Resilience Action Partners	Amber Greene amber.greene@ogilvy.com	(646) 522-9271
		Melissa Herlitz, AICP melissa.herlitz@mbakerintl.com	(646) 682-5558

FEMA

FEMA Mitigation Division

Risk MAP - Mapping Assessment and Planning:
Provide updated flood hazard data to 100% of populated U.S. coasts to create stronger and safer communities
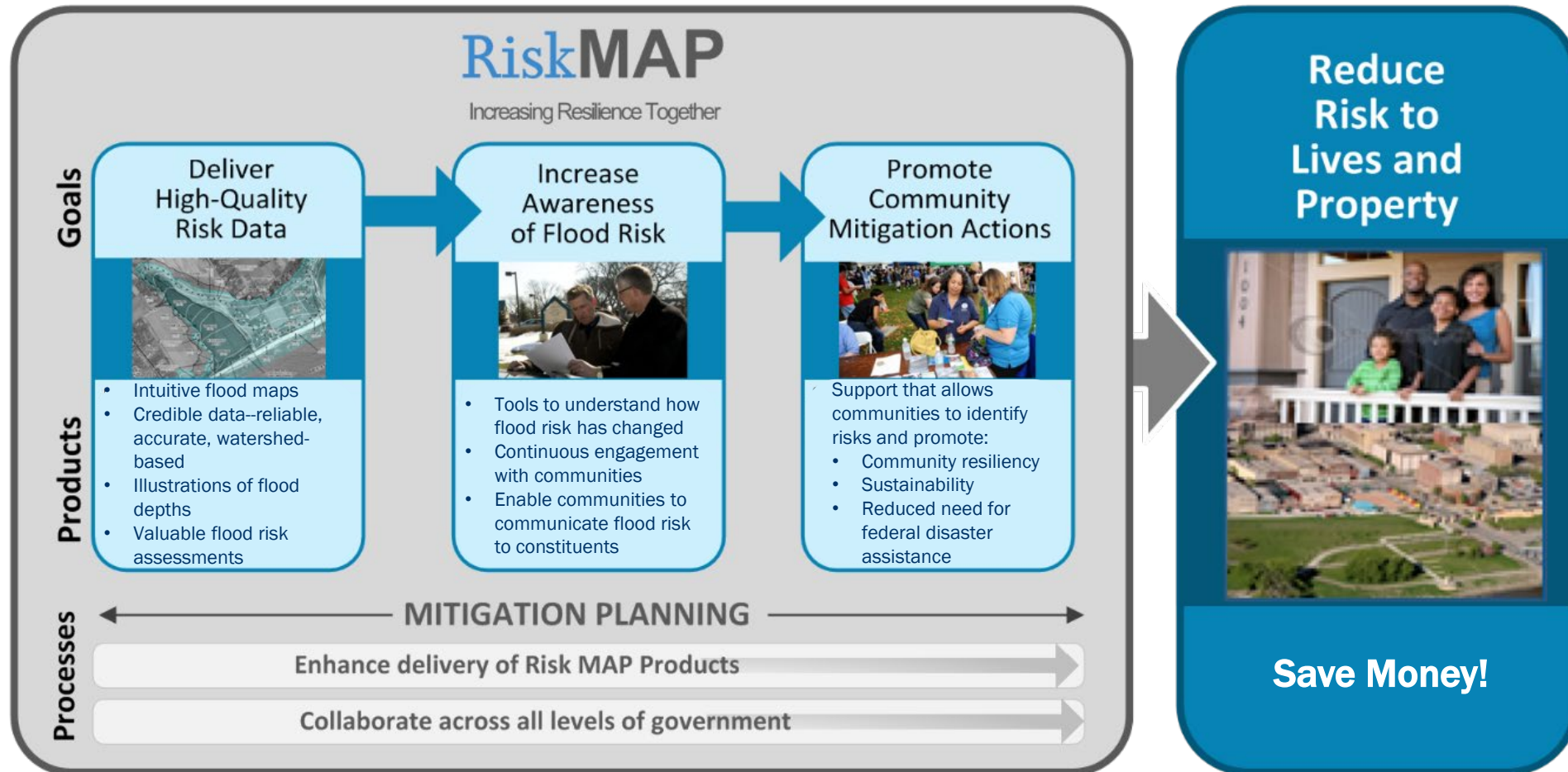
Flood Maps Affect Important Decisions

To Identify Hazards and Assess Flood Risk

To Establish Rates for Flood Insurance

To Inform Local Land Use Planning

To Inform Engineers and Developers

To Equip Emergency Managers

National Flood Insurance Program (NFIP)

- Voluntary program based on a mutual agreement between the Federal government and the local community.

- In exchange for adopting and enforcing a Floodplain Management ordinance, Federally-backed flood insurance is made available.

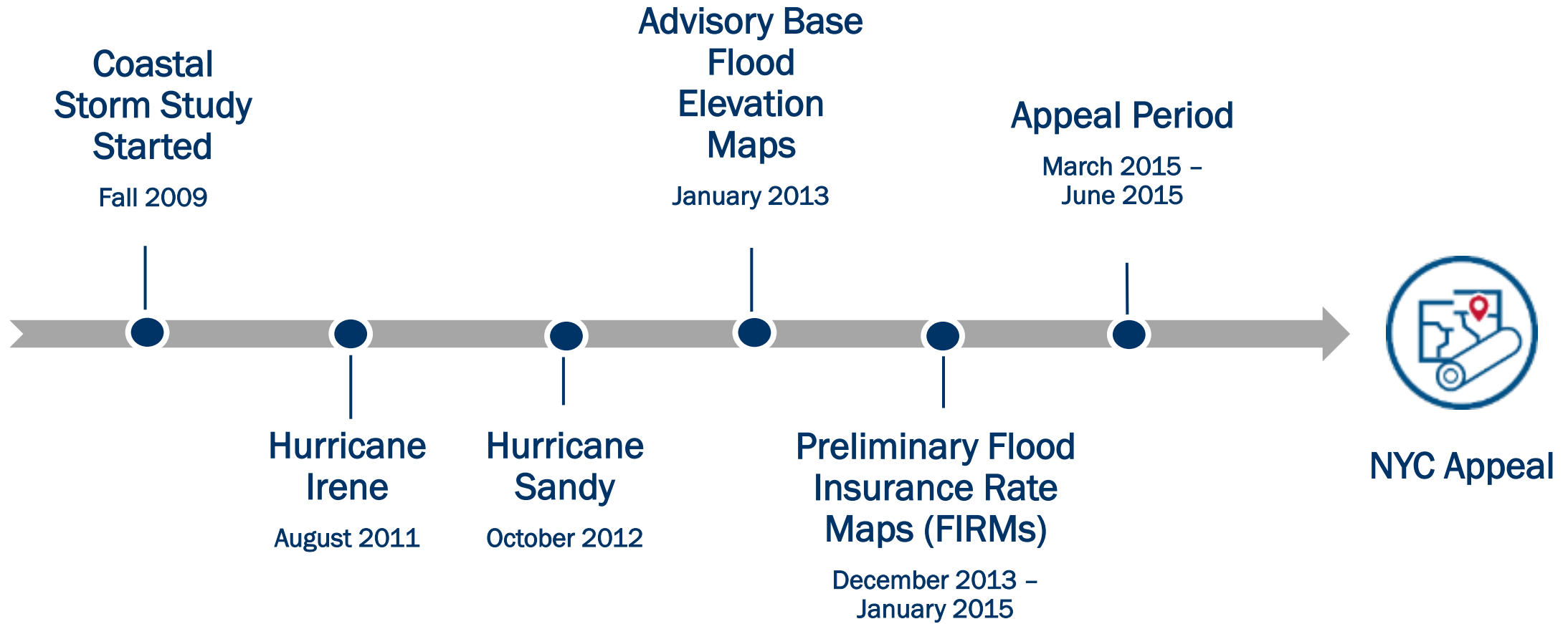| Federal	State	Local
- Identify and Map Risk - Set Building and Development Standards - Provide Flood Insurance	- Establish Building Codes - Set Enhanced Building and Development Standards - Provide Technical Assistance	- Adopt and Enforce Development and Building Standards - Issue Permits and Maintain Records

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Coastal Restudy Background

Coastal Study Analysis: 2009 - 2015

Coastal Storm Study Started

Fall 2009

Advisory Base Flood Elevation Maps

January 2013

Appeal Period

March 2015 – June 2015

Hurricane Irene

August 2011

Hurricane Sandy

October 2012

Preliminary Flood Insurance Rate Maps (FIRMs)

December 2013 – January 2015

NYC Appeal

Coastal Appeal Outcome

NYC Appeal

- New York City challenged two aspects of FEMA's storm surge analysis:
  1) Extra-tropical storm validation
  2) Representation of tidal effects

FEMA Response

- A third-party Independent Review Board (IRB) acknowledged NYC's findings and outlined next steps
- FEMA initiated a series of analyses and "sensitivity tests" to determine next steps
  - Sensitivity analyses conducted based on recommendations from the IRB and were finalized in Summer 2017. Results are informing restudy
  - Region II storm surge, started late 2017, and restudy data will include storms occurring post-2009 – Irene, Sandy, 2016 Nor'easter, etc.

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Post-Appeal Community Engagement

➤ October 2016
- Met with City of New York to begin appeal resolution discussions
- Briefed New Jersey and New York State government and congressional delegation

➤ November 2016 – March 2017
- New Jersey briefings in coastal communities

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Effective Vs. Preliminary FIRMs

➤ **Effective FIRMs**
- Flood insurance through the National Flood Insurance Program (NFIP) will continue to be based on current effective FIRMs

➤ **Preliminary FIRMs**
- Some communities refer to the PFIRMs for best available data for development purposes
- Federal Sandy recovery projects were informed by PFIRMs in New York City, Rockland, and Westchester Counties (NY) and coastal New Jersey counties

Preliminary Map Adoption

Several communities opted to adopt the 2015 Preliminary coastal maps

County	Communities	LFD Date	Effective Date
Atlantic	Absecon, Brigantine, Egg Harbor Township, Hamilton, Linwood, Longport, Margate City, Mullica, Weymouth	2/28/2018	8/28/2018
Cape May	Every community except Lower Township	4/5/2017	10/5/2017
Monmouth	Highlands, Little Silver, Matawan, Monmouth Beach	12/20/2017	6/20/2018
Ocean	Jackson, Point Pleasant Beach	12/20/2017	6/20/2018

Coastal Restudy Overview

Coastal Restudy Enhancements

Issue 1: Extratropical Storm Validation

Issue 2: Representation of Tidal Effects

Issue 3: Inclusion of Additional Storm Events
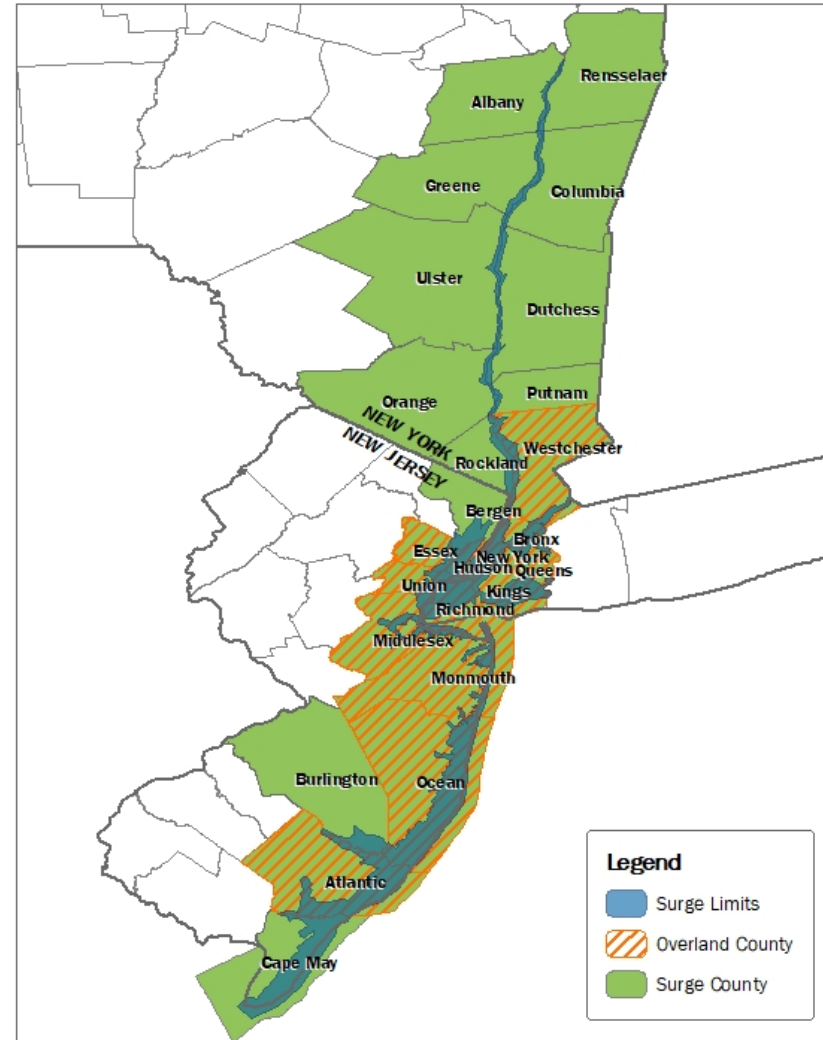
Overview of Restudy Area – Surge Study

- Tidal Hudson River
- Western Long Island Sound
- New York & Raritan Bay
- Atlantic Ocean
- Does not include Delaware Bay
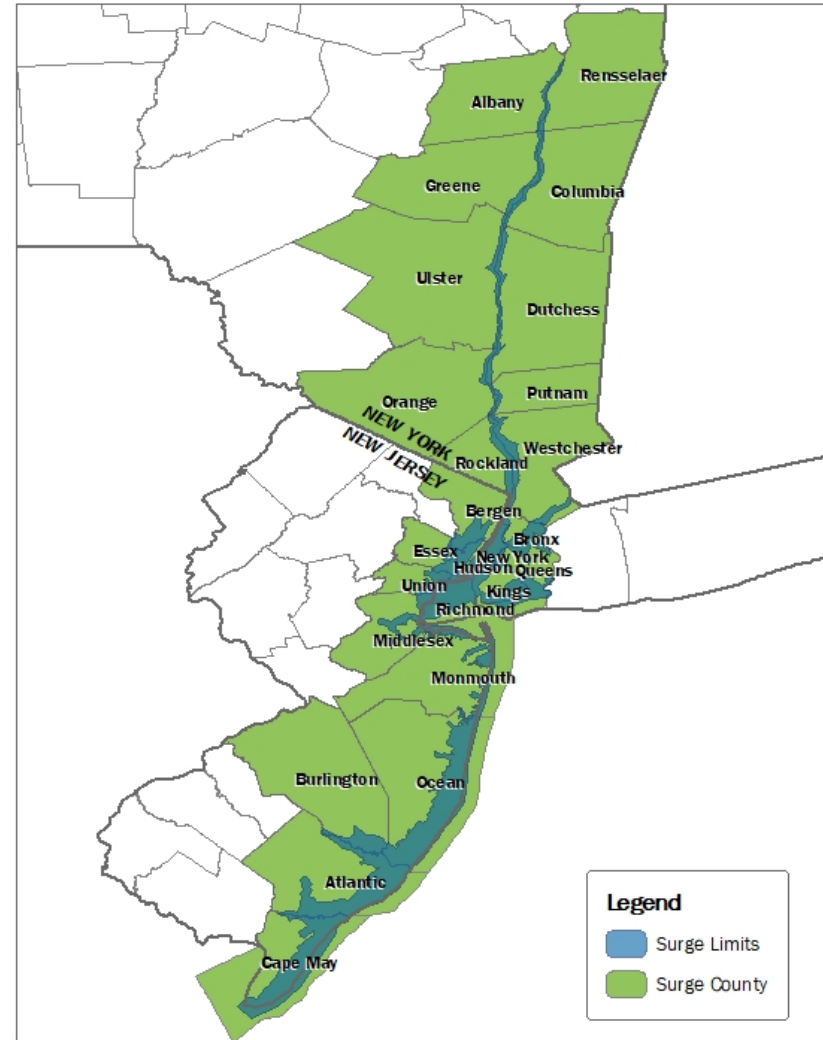
Overview of Restudy Area – Overland Analyses and Mapping

- NY: New York City boroughs and Westchester County
- NJ: Atlantic, Essex, Hudson, Middlesex, Monmouth, Ocean, and Union Counties

Quality Assurance

- **Coastal Steering Committee (CSC)**
  - Internal group of experts in storm surge modeling and FEMA coastal study process
  - Independent from study production

- **Coastal Advisory Panel (CAP)**
  - State of New Jersey, State of New York, Port Authority of NY and NJ, NYC, FEMA, and CSC

Key Milestones

Summer 2017	2017-2021	2018-2022	2022	2023	2024
Sensitivity Analysis	Storm Surge and Wave Conditions Reanalysis	Wave Hazard Analyses and Floodplain Mapping	Draft Work Maps - Flood Risk Review Meeting	Preliminary Maps – CCO and Open House Meetings	Appeal Period Followed by Letter of Final Determination and Effective Maps

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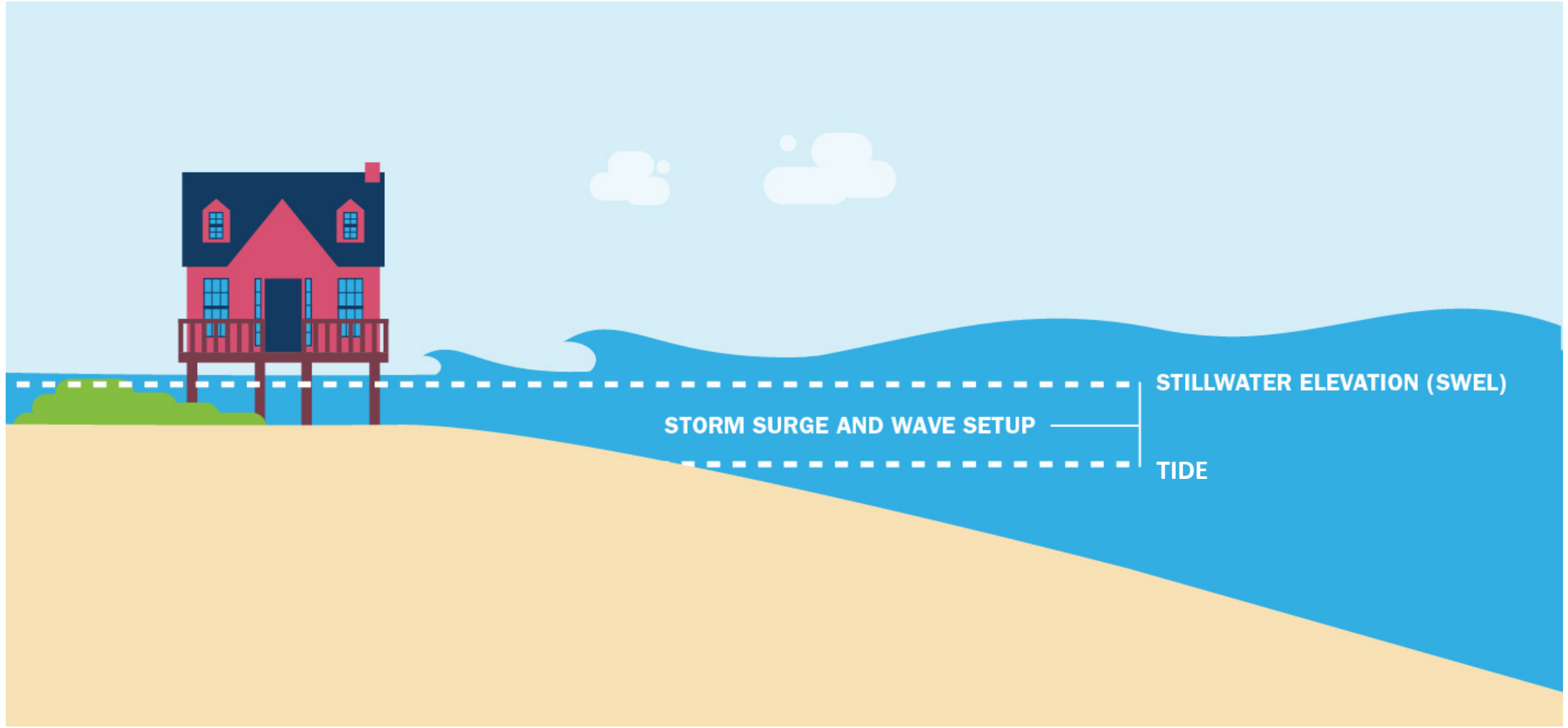
Coastal Restudy Phase 1

Coastal Restudy Phase 1: Storm Surge Study

STILLWATER ELEVATION (SWEL)

STORM SURGE AND WAVE SETUP

TIDE

What is an Intermediate Data Submittal?

Intermediate data submittals are reports that document milestones for a coastal study's proposed technical approach and processes, including details about the storm surge study and modeling that will inform the wave analyses.

The reports provide detailed data that can later be used to reconstruct or support the study results.

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Intermediate Data Submittals

IDS #1
Data Acquisition and Technical Approach

IDS #2
Offshore Water Levels and Waves: Storm Selection and Numerical Model Validation

IDS #3
Offshore Water Levels and Waves: Production Runs and Statistical Analyses

IDS #4
Nearshore Hydraulics

IDS #5
Flood Hazard Mapping
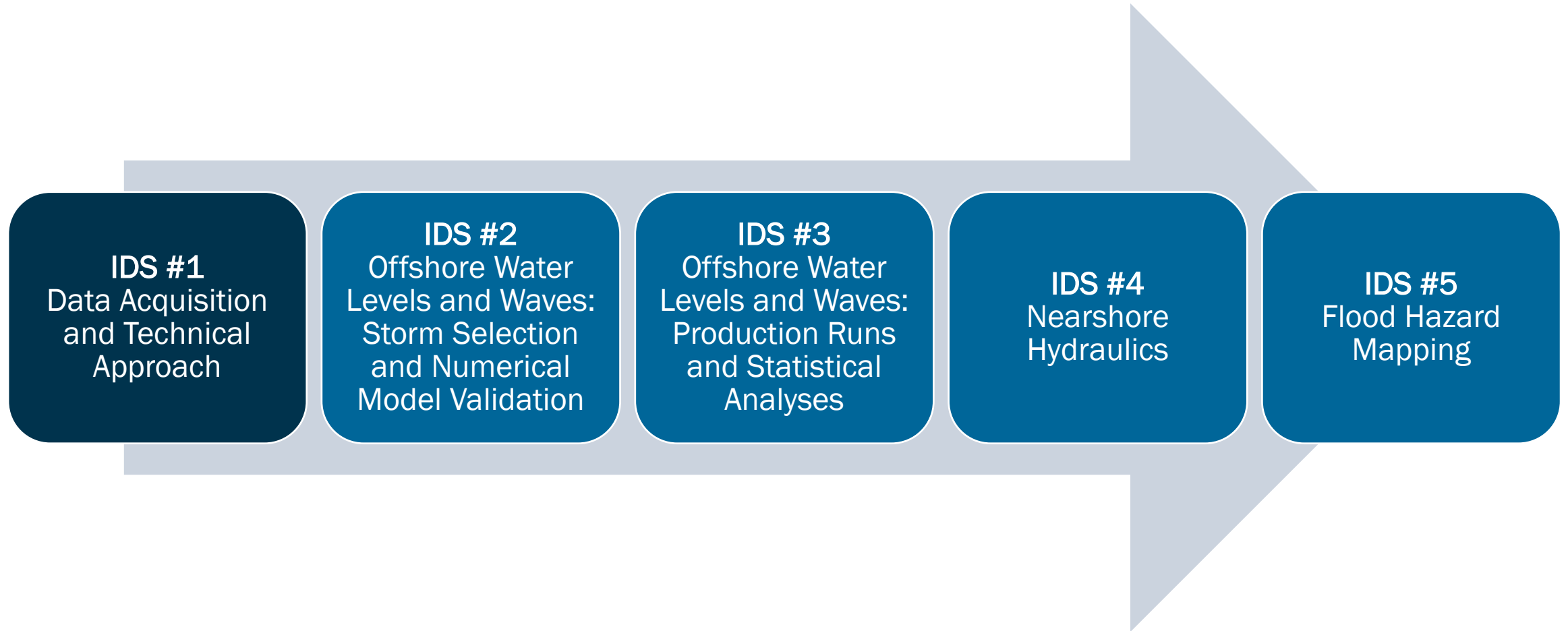
Storm Surge Study: Intermediate Data Submittal #1

IDS 1: Understanding the Data and Technical Approach for the Storm Surge Study	
1	Technical Approach
2	GIS Analysis of Coastal Features, Study Area Characteristics and Site Reconnaissance
3	Review of STARR II Coastal Sensitivity Analysis Recommendations and Path Forward
4	Tropical Storm Validation Storm Selection
5	Extra-Tropical Storm Validation Storm Selection
6	Topo-Bathy-Digital Elevation Model (DEM) Development
7	Storm Climatology and Initial Probabilistic Model Development
8	Storm Wind Field Methodology
9	Hydrodynamic & Wave Model Development

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Coastal Restudy Enhancements: Issue 1

Extratropical Storm Validation

→

- Model error analysis and bias assessment
- Assessment of the 1950 storm event
- Reanalysis of historical wind fields
- Compare measured water levels to model results for all 50 extra-tropical cyclones in storm suite
- Develop uncertainty term from this extensive model validation

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Coastal Restudy Enhancements: Issue 2

Representation of Tidal Effects

- Improve analysis of non-linear tide/surge interaction
- Develop a modified linear superposition (MLS) method to develop site-specific regression curves to define tide and surge interaction
- Apply these MLS-derived regression curves to estimate tide effects for all 50 storms and develop associated uncertainty

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Coastal Restudy Enhancements: Issue 3

Inclusion of Additional Storm Events

- Expand validation effort to include additional tropical cyclones and post-2009 events, including Hurricanes Sandy and Irene, to improve study overall
- Cyclones provide recent events with extensive measured datasets to apply in validation effort

Topographic Datasets

Year	Description	Data Type	Source/Owner
2014	2014 NOAA Post-Hurricane Sandy LiDAR Mapping for Shoreline Mapping/New Jersey	LiDAR-based DEM	NOAA
2014	New York CMGP Sandy LiDAR	LiDAR-based DEM	USGS
2013–2015	USGS NED DEM	LiDAR-based DEM	USGS
2017	NYC LiDAR	LiDAR-based DEM	NYC DoITT
Varies	CoNED	LiDAR-based DEM	USGS
Varies	FEMA Region II DEMs (FEMA, 2014)	LiDAR-based DEM	RAMPP
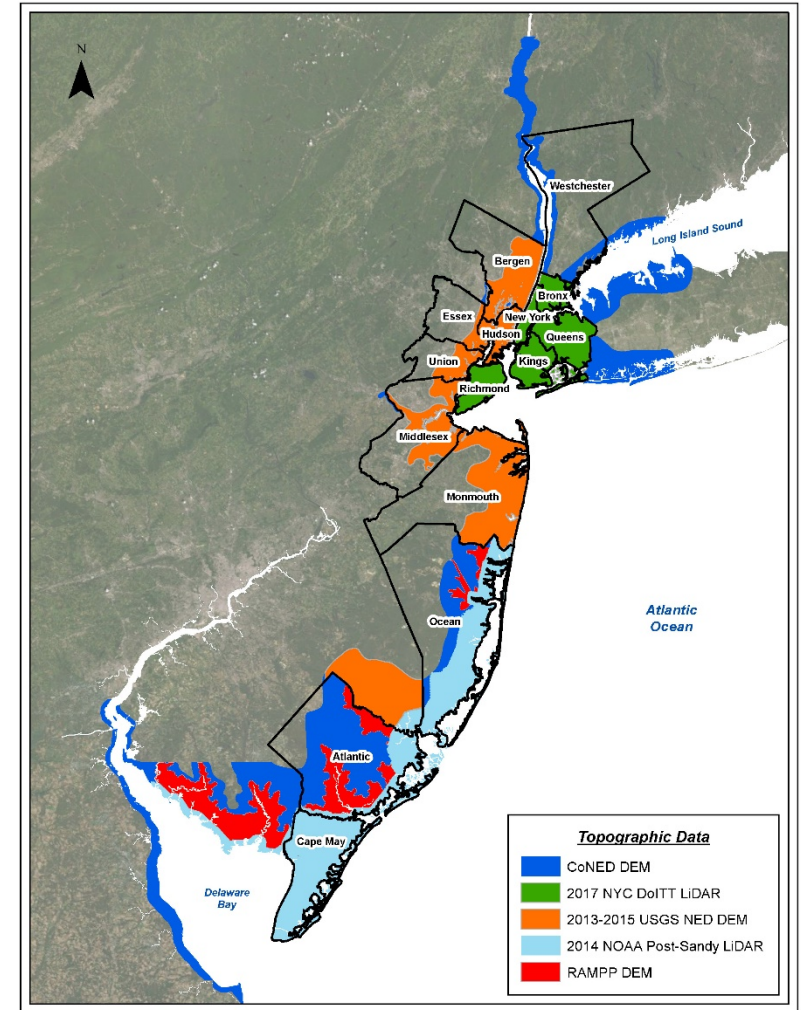
Bathymetric Datasets

Year	Description	Data Type	Source/Owner
2017	NYC LiDAR Nearshore bathy	DEM	NYC DoITT
2014 to 2015	NJDOT Dredging surveys	Points	NJDOT
2014 to 2015	USACE Surveys for riverine and shipping channels	Points	USACE
2014	2014 NOAA Post-Hurricane Sandy LiDAR Mapping for Shoreline Mapping/New Jersey	DEM	NOAA
1998 to 2004	Hudson River Estuary Program	DEM	
1915 to 1980	National Ocean Service (XYZ and BAG)	Points	NOAA
Varies	Electronic Nautical Charts	Breaklines	NOAA
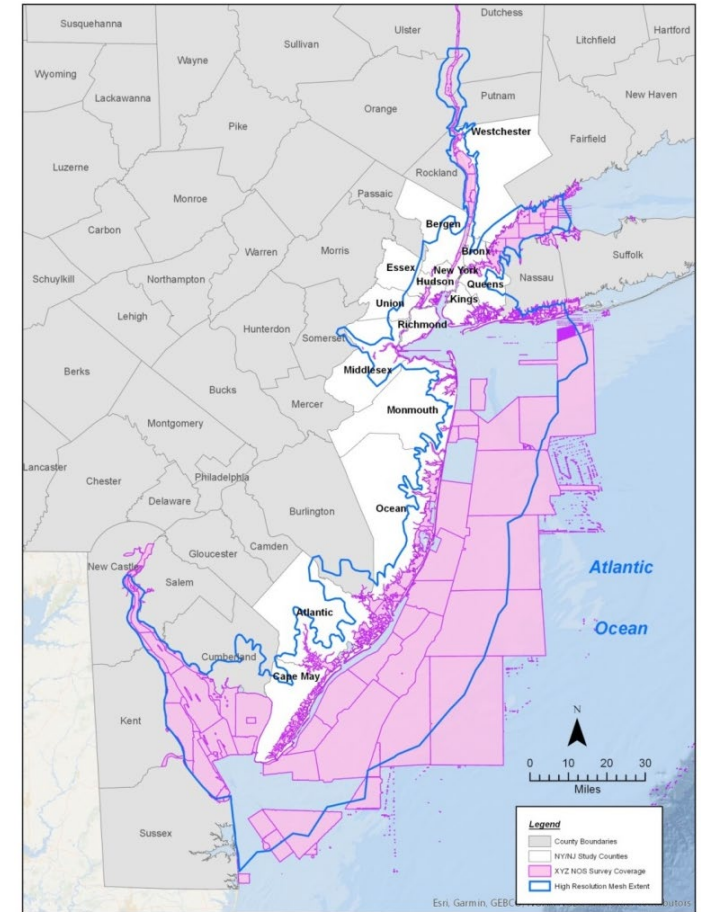
Example of bathymetric data:
NOS XYZ surveys

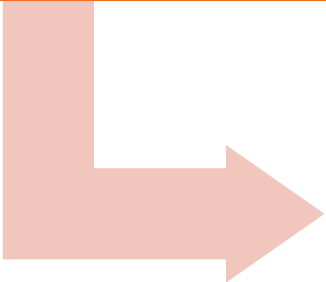# Final Seamless DEM
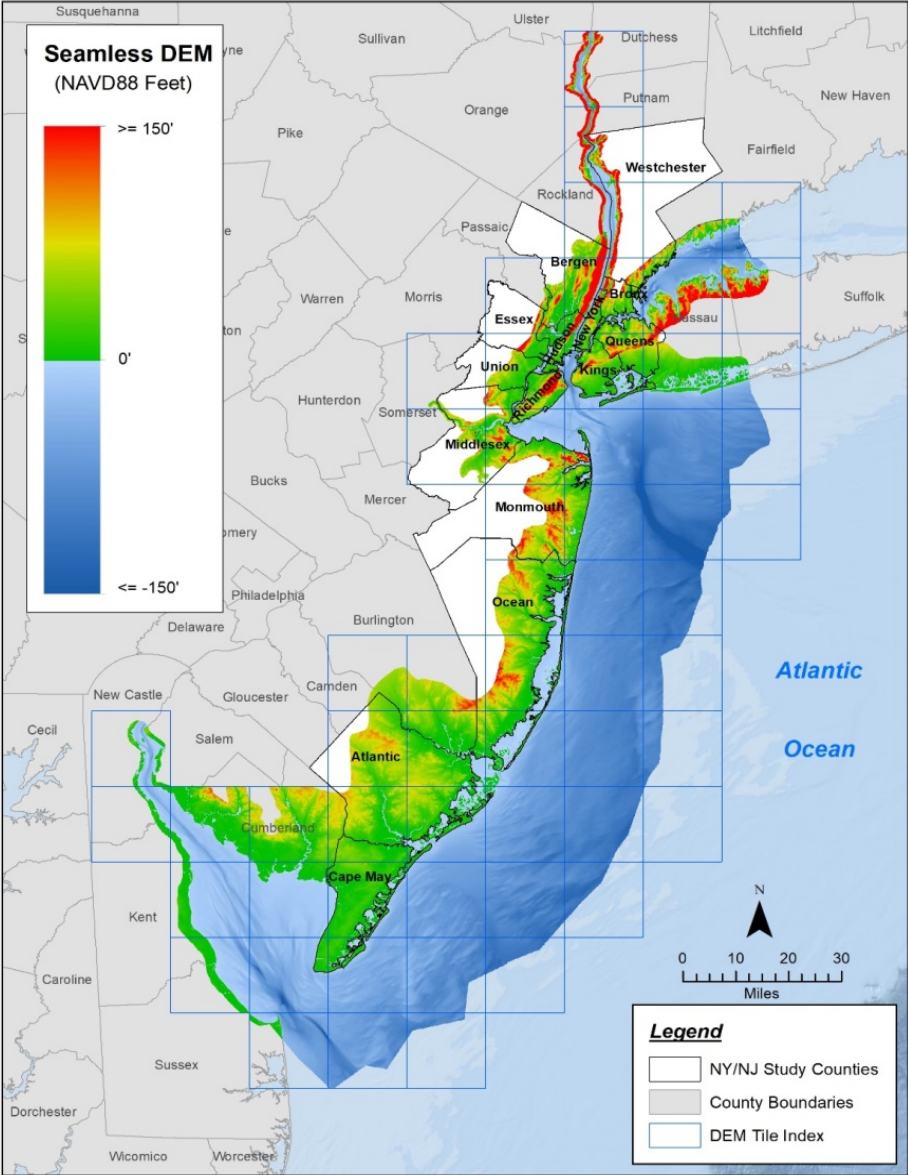
Higher Resolution for DEM Dataset
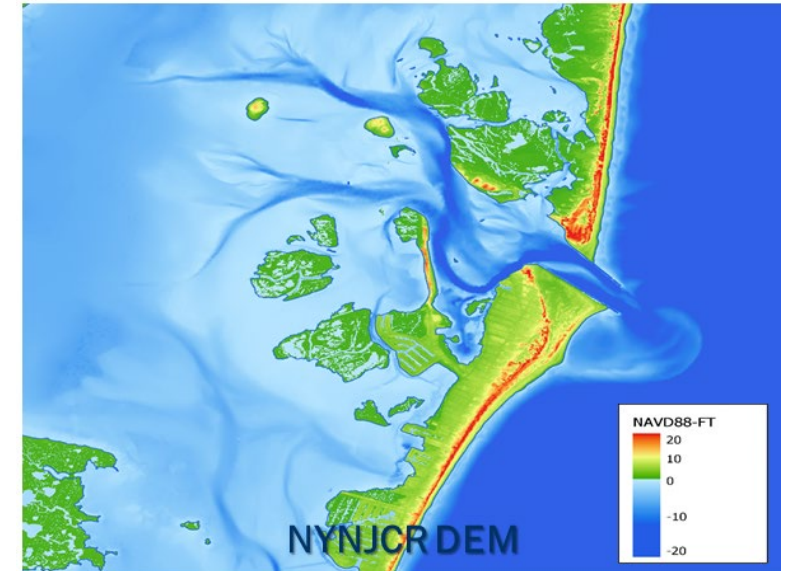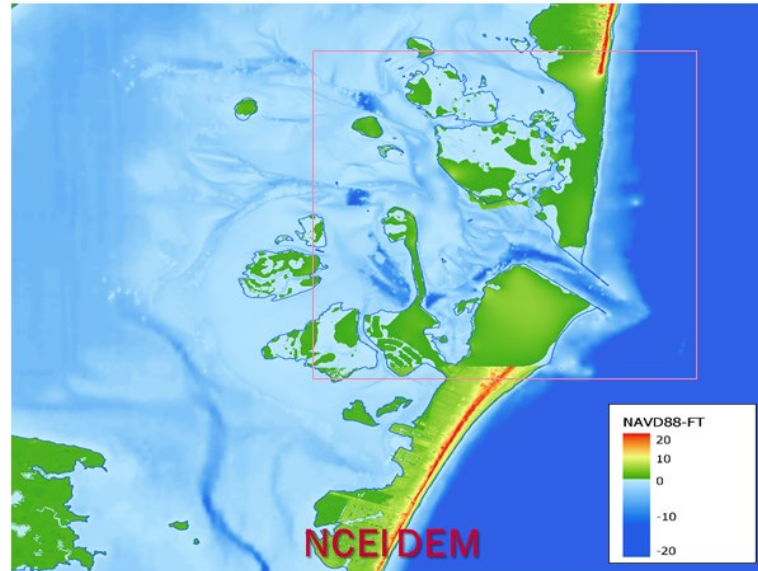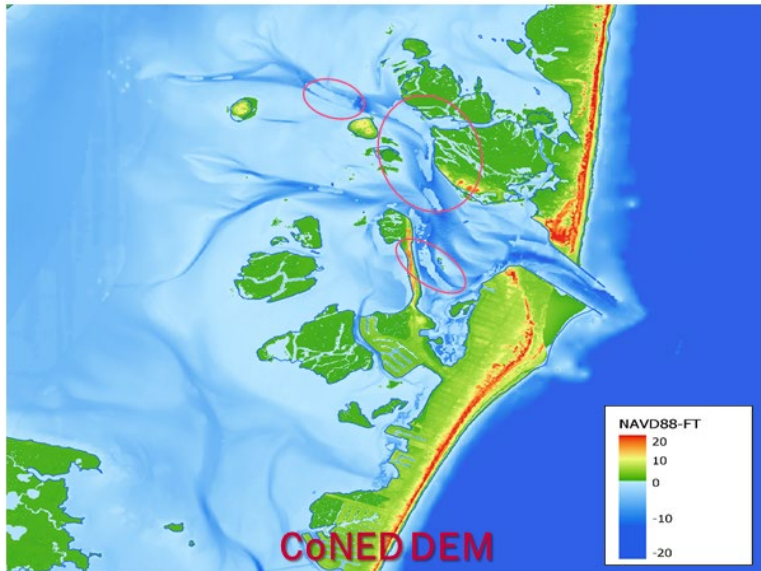
Barnegat Inlet, Ocean County, NJ

What is Mesh?

Previous Study Mesh
600k nodes

Current Restudy Mesh
900k nodes

Project Area

Open Ocean Boundary
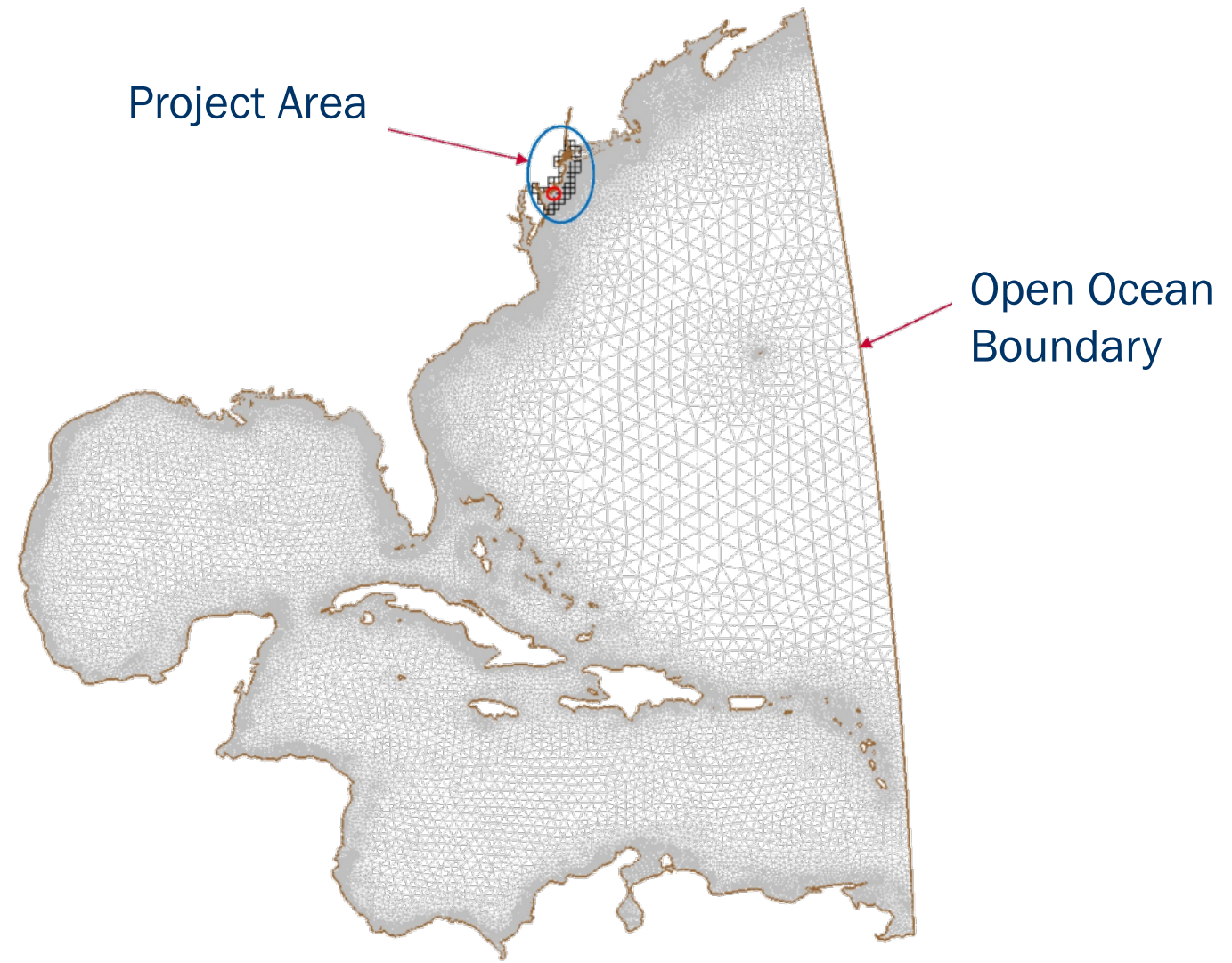
How Mesh is Used in the Restudy

Elevation, ft-NAVD

Updated seamless topo-bathy DEM tile elevation contours

Updated DEM tile interpolated onto updated mesh nodes
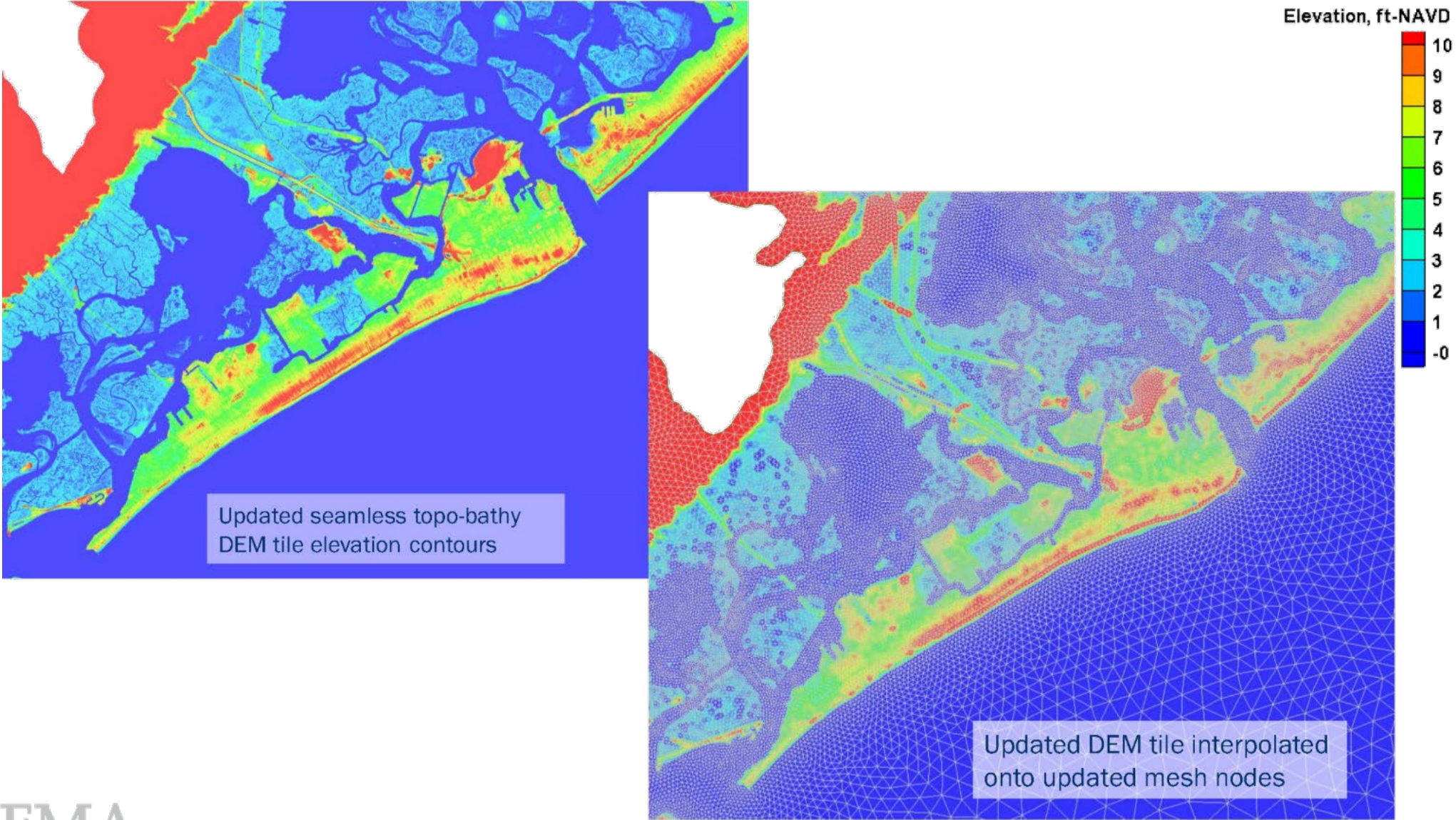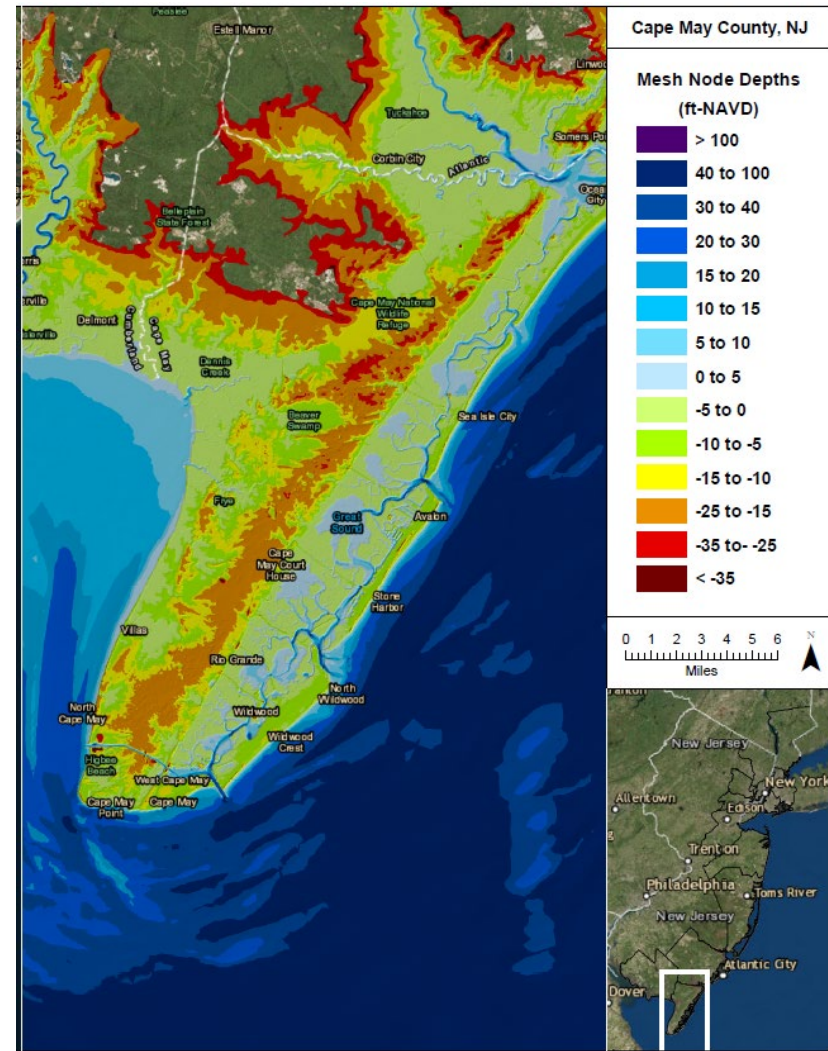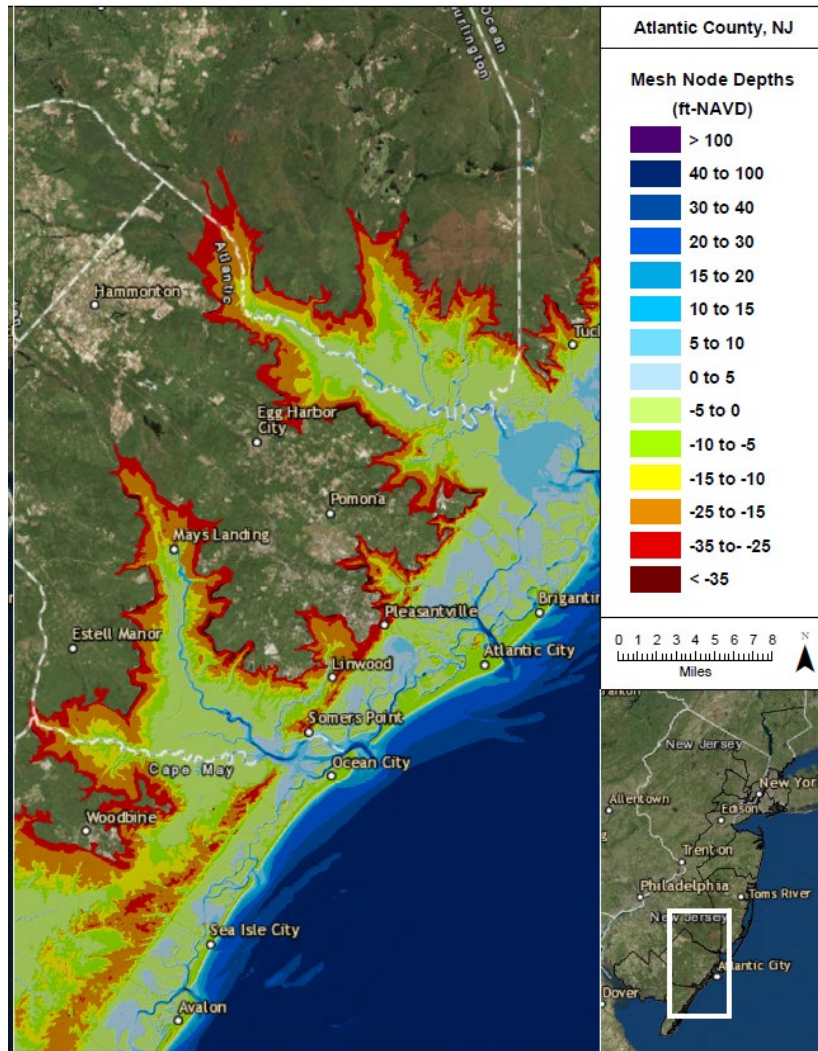
Improvements to Mesh in the Restudy
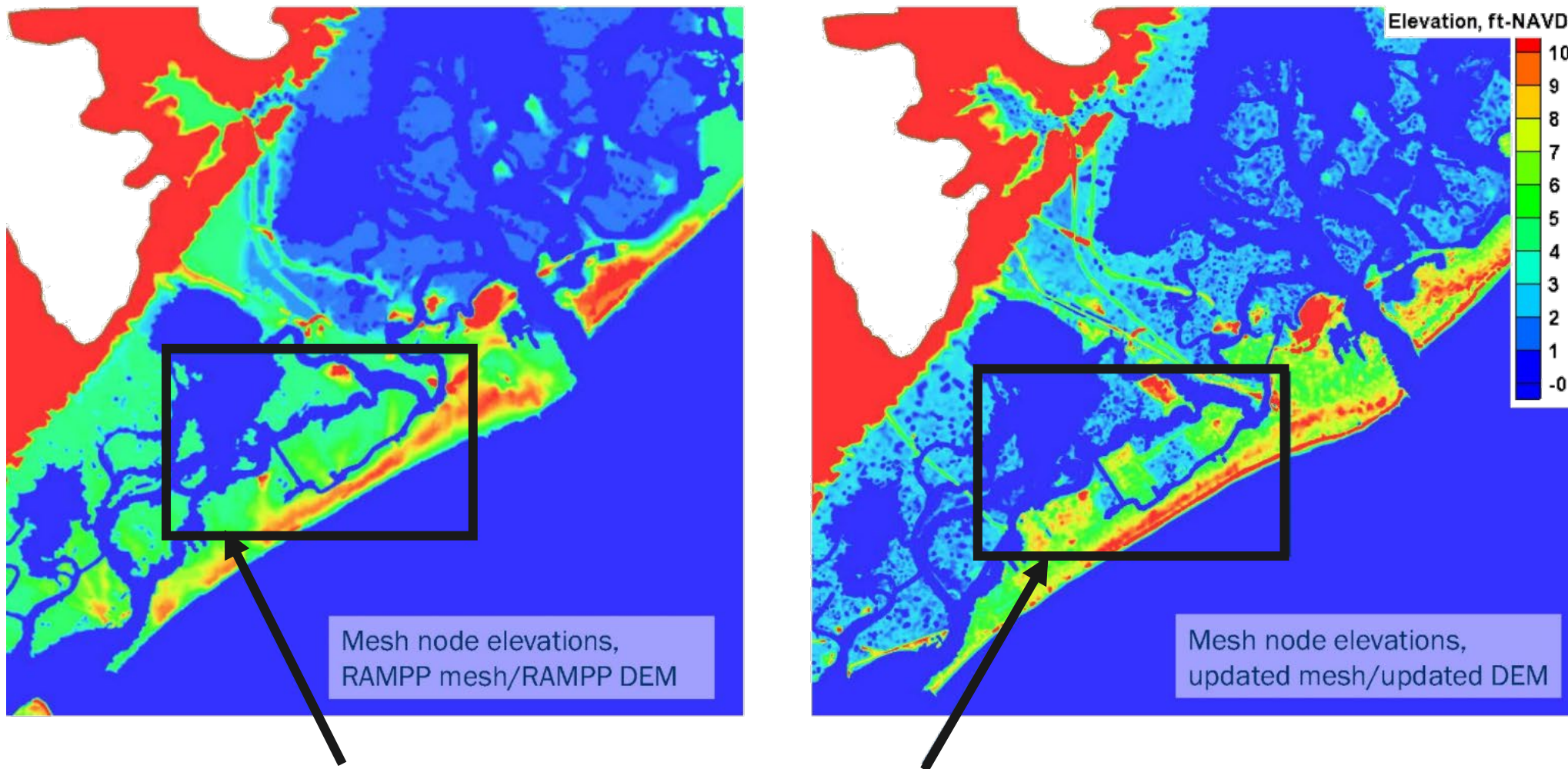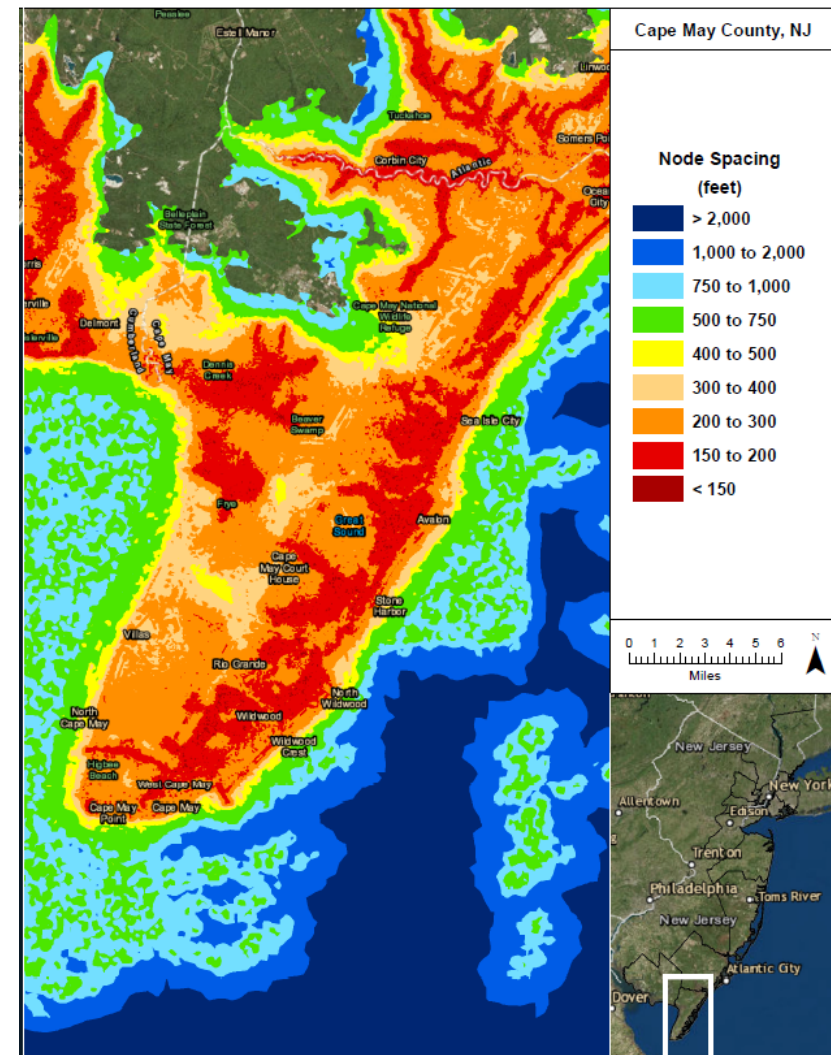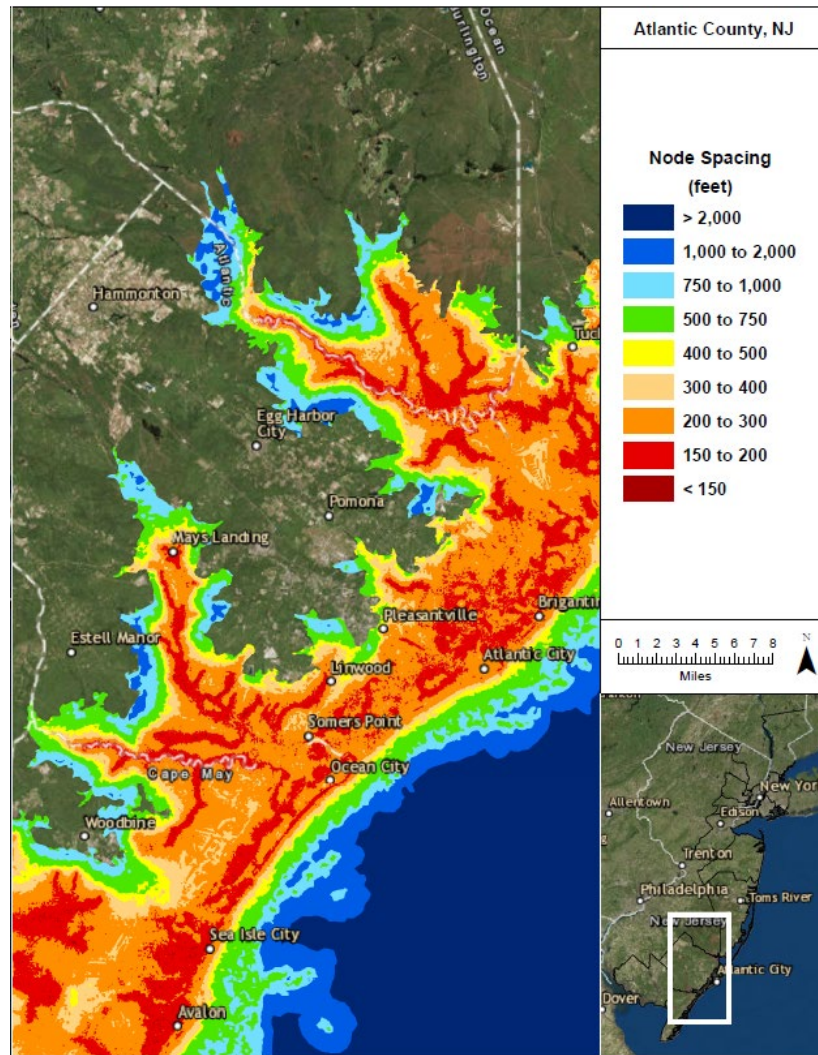

Example of area showing different mesh features
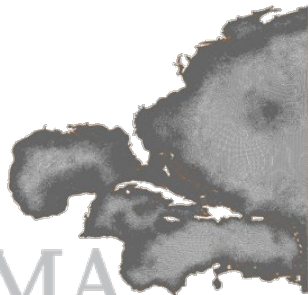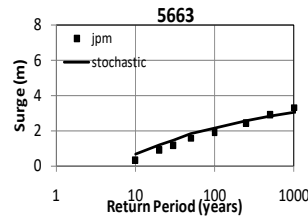
Mesh Node Depths in Atlantic & Cape May Counties

Mesh Node Spacing in Atlantic & Cape May Counties

Storm Surge Study: Stillwater Elevation (SWEL)
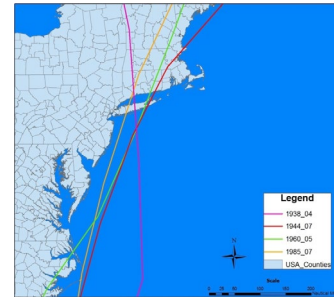
Storm Forcing
Tropical and Extra-Tropical Tracks

Storm Surge Modeling
Wind, Waves, Water Levels

High Resolution Mesh

Validation
Historical Storms & Tides

Return Period Analysis
JPM-OS for Tropical Storms (low freq.)
EST Analysis for Extra-Tropical Storms (high freq.)
Analysis to Develop Combined Probability

Stillwater Elevation
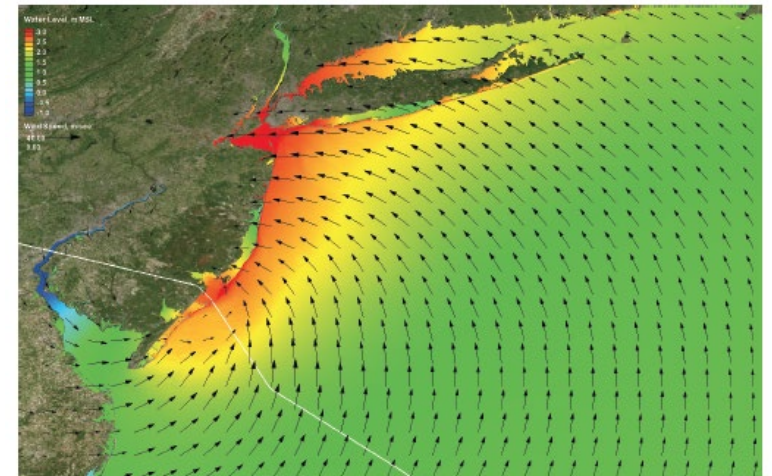
JPM-OS: Joint Probability Method - Optimum Sampling
EST: Empirical Simulation Technique

Storm Surge Study: Storm Climatology

- Reviewed historical storms
- Selected 5 tropical cyclones and 50 extra-tropical cyclones to validate the surge model
- Generated hundreds of hypothetical storms
- Analyzed important storm parameters
  - Central pressure
  - Radius to maximum winds
  - Forward speed
  - Storm heading
  - Holland B (shape parameter)

Storm Surge Study: Tropical Cyclone Storm Validation
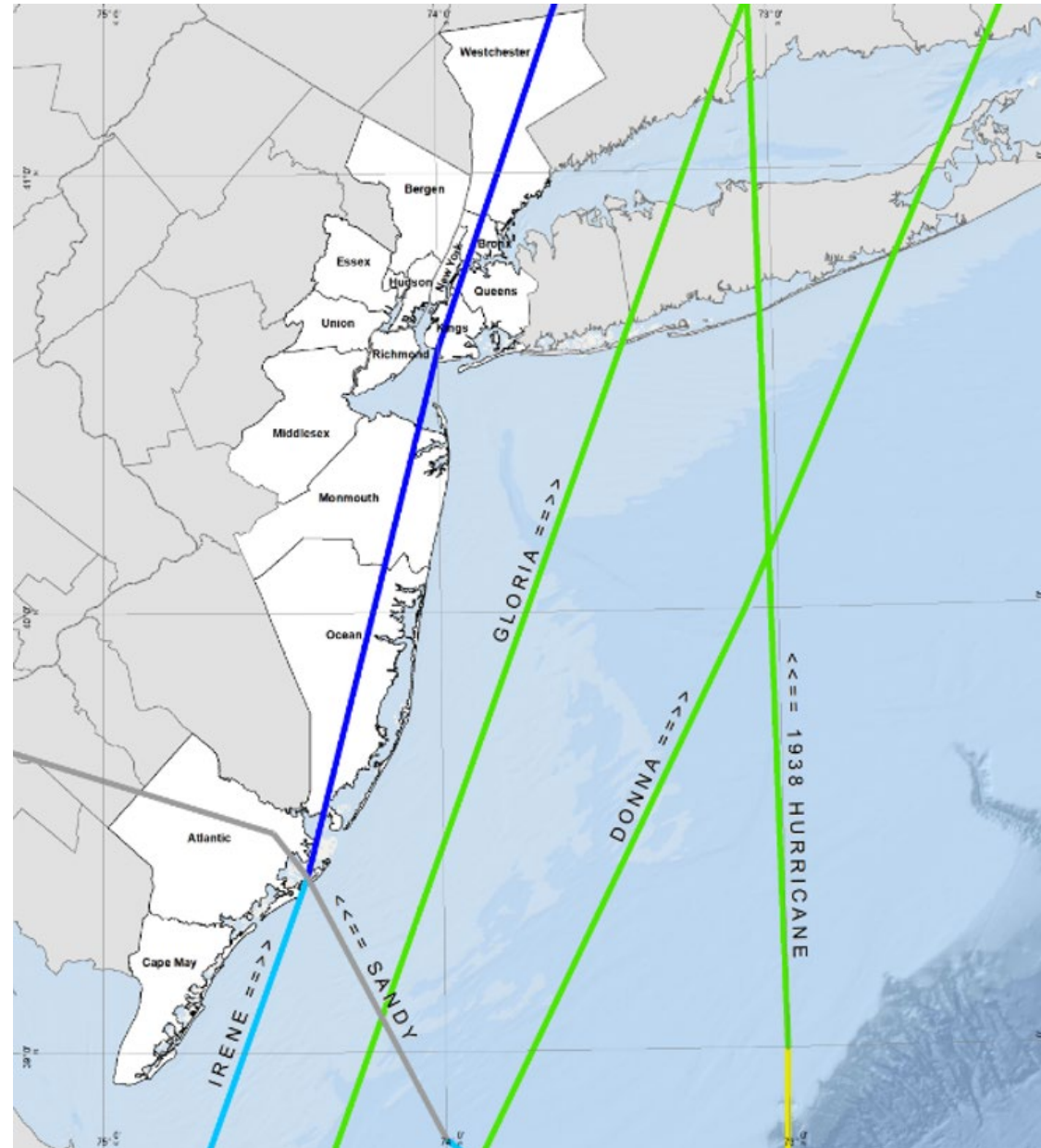
Storm Surge Study: Tropical Cyclone Storm Validation

Storm Surge Study: Extra-Tropical Storm Validation

Storm Surge Study: Land Classification Data
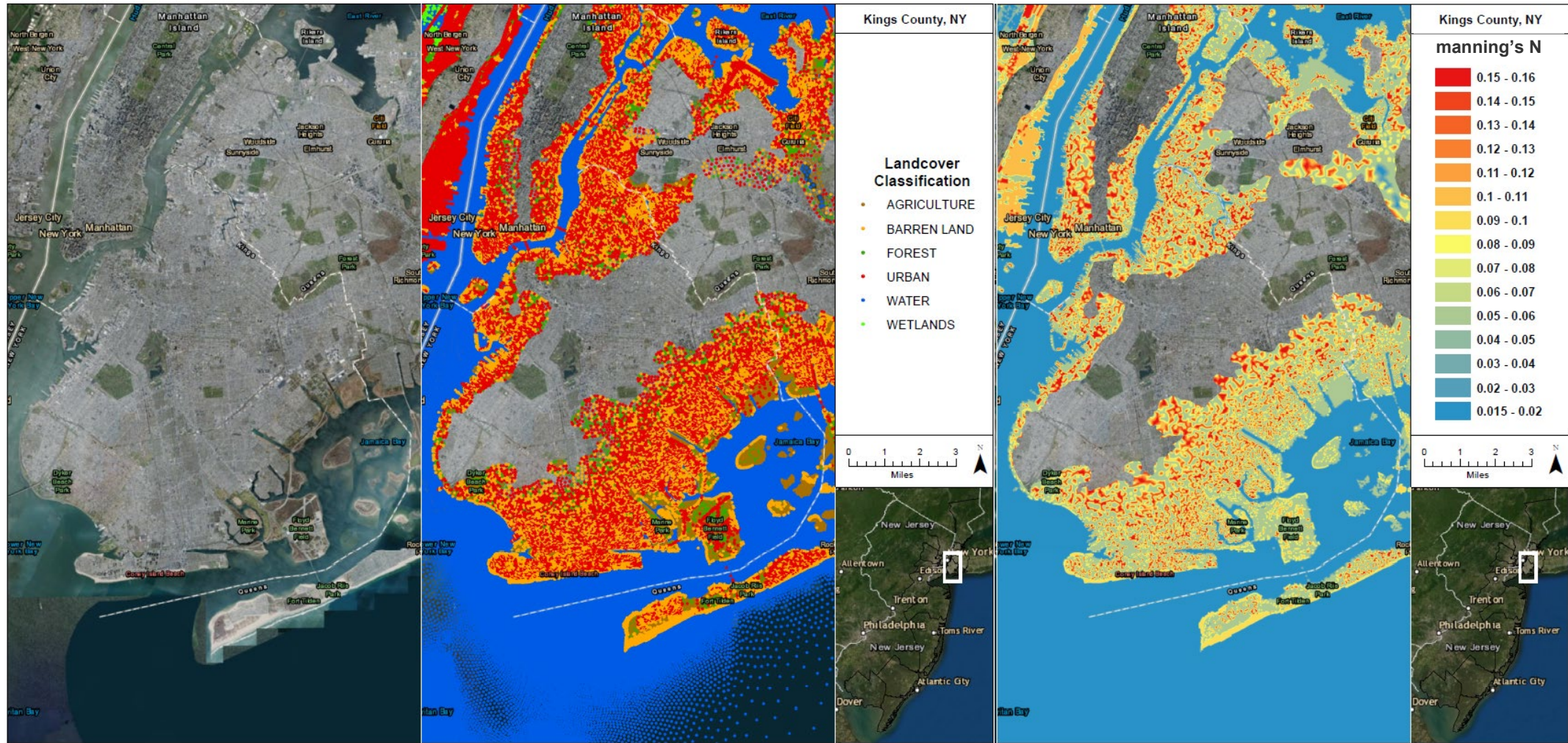
Storm Surge Study: Land Classification Data

Storm Surge and Wave Conditions Reanalysis Progress

Updating the Digital Elevation Model

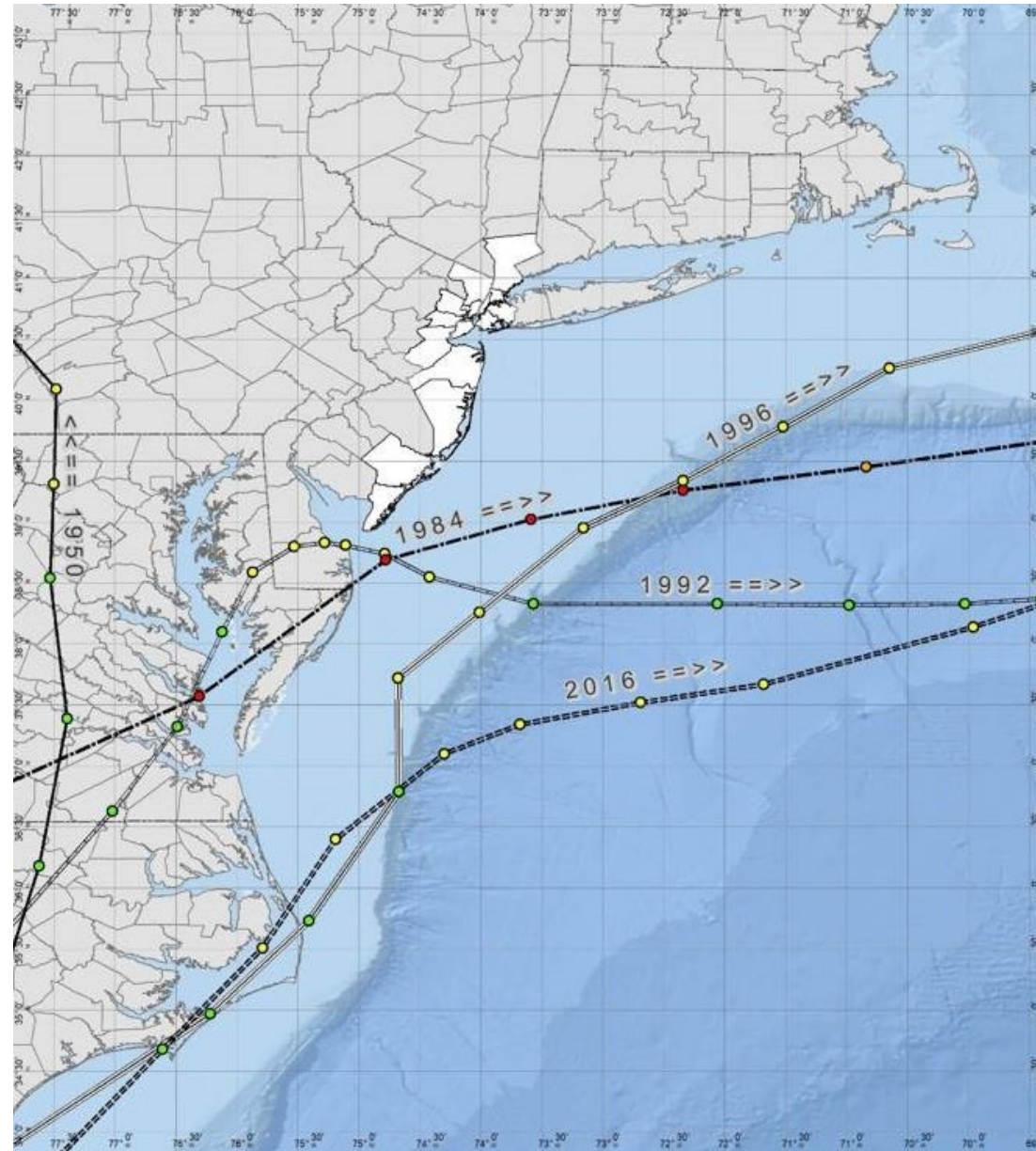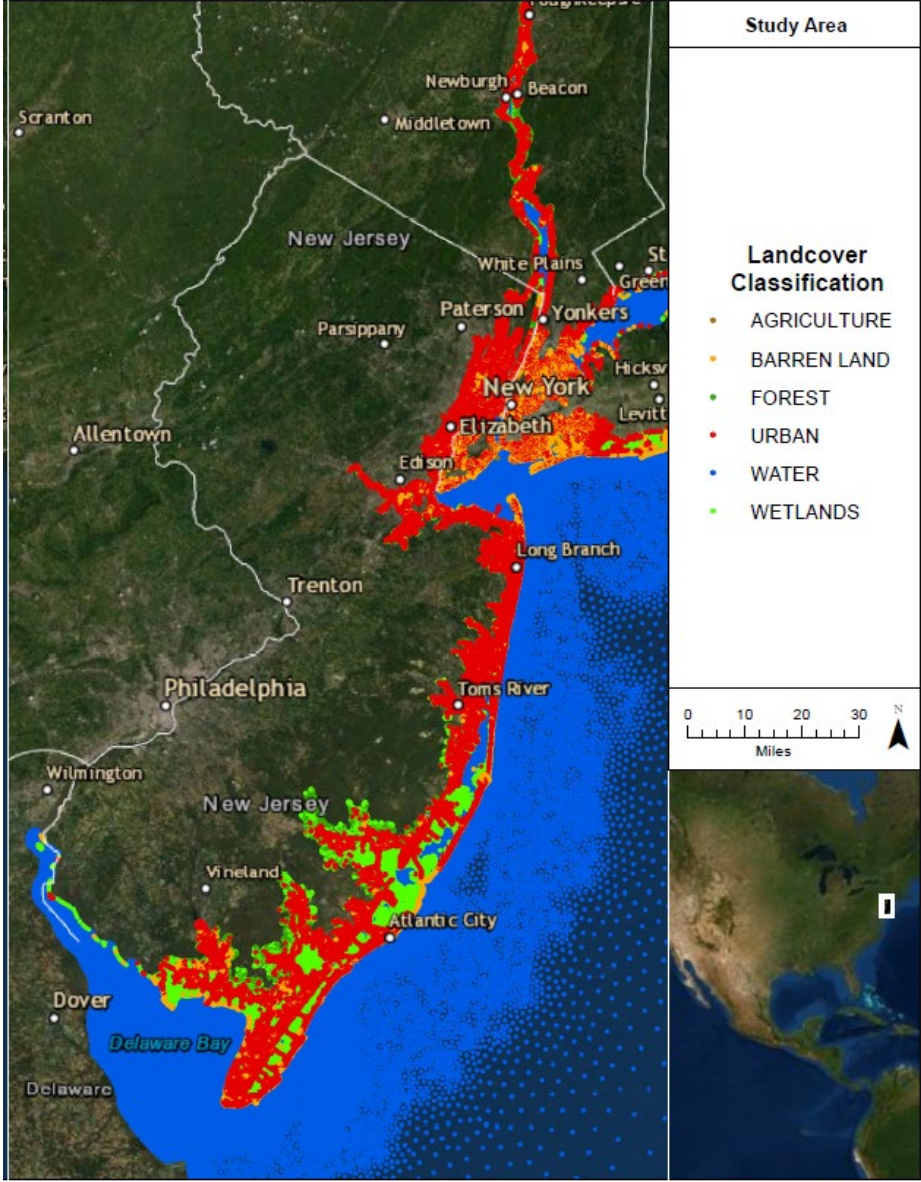- A DEM is a map of ground and sea floor elevation that is used in the storm surge and wave models

✓ The DEM has been completed using the latest elevation data

Updating the Storm Surge Model

- Model has been updated and improved with additional assessments of coastal features like seawalls and beach nourishment
- Information from recent storm events were added
- This will generate more accurate maps

Model Validation

- Measured data from tide gauges and high-water marks during historic events are compared to estimates reproduced by the model

Field Research and Documentation

- Five Intermediate Data Submittals (IDSs) will document the study
- IDS #1-3 focus on storm surge
- IDS #4-5 focus on wave analyses and coastal mapping

✓ IDS #1 is complete

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Preview of IDS #2 and #3

IDS #2

- Validates the storm surge model and summarizes Joint Probability Method-Optimum Sampling development
- Expected release in 2020

IDS #3

- Summarizes storm surge runs and frequency analysis
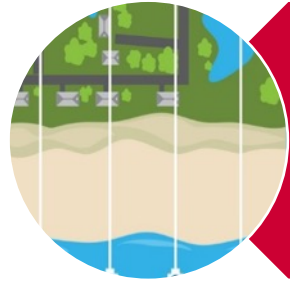- Expected release in 2020

Coastal Restudy Phase 2

Coastal Restudy Phase 2: Wave Hazard Analysis

Define cross-shore transects

Evaluate storm-induced erosion and shore protection structures

Wave hazard modeling: overland wave propagation and wave run-up/overtopping

Opportunities for Collaboration

ATLANTIC COUNTY, NJ

SEPTEMBER 2019

FEMA — U.S. DEPARTMENT OF HOMELAND SECURITY

274,550
POPULATION BASED ON 2010 CENSUS

47 % PENETRATION RATE IN THE SFHA

9 PUBLIC ASSISTANCE DECLARATIONS SINCE 2010

6 NUMBER OF APPEALS RESOLVED

157 COASTAL MILES STUDIED *

$484,839,700 TOTAL CLAIMS PAID SINCE 1978

$6,601,526,700 FLOOD INSURANCE COVERAGE

20,740 NUMBER OF INSURANCE CLAIMS RECORDED

75 % HOMEOWNERSHIP BASED ON ACS 5-YEAR ESTIMATE

28,530 NUMBER OF FLOOD INSURANCE POLICIES IN FORCE

KEEPING ATLANTIC SAFE: Your Risk MAP Timeline

YOU ARE HERE*

Restudy Kick-off Meeting April 2018

Study Update Meetings 2019-2021

Flood Risk Review Meeting 2022

Preliminary Maps 2023

Consultation Coordination Officer Meeting, Open House, Appeal Period 2023-2024

Letter of Final Determination and Effective FIRMs 2024

*Numbers and dates are subject to change

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CAPE MAY COUNTY, NJ | SEPTEMBER 2019

FEMA
U.S. DEPARTMENT OF HOMELAND SECURITY

97,265
POPULATION BASED ON 2010 CENSUS

20 % PENETRATION RATE IN THE SFHA

7 PUBLIC ASSISTANCE DECLARATIONS SINCE 2010

$414,248,800
TOTAL CLAIMS PAID SINCE 1978

5 NUMBER OF APPEALS RESOLVED

212 COASTAL MILES STUDIED *

$12,620,699,400
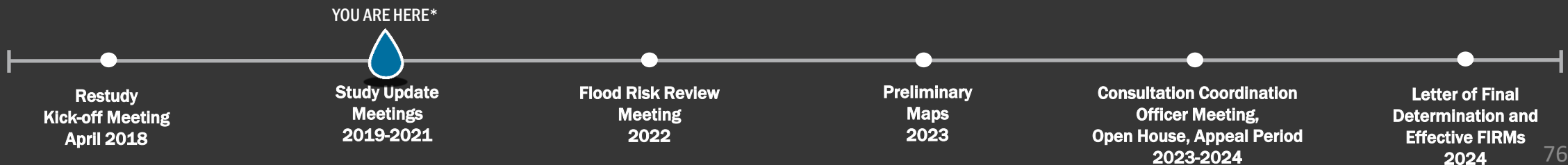FLOOD INSURANCE COVERAGE

28,350 NUMBER OF INSURANCE CLAIMS RECORDED

77 % HOMEOWNERSHIP BASED ON ACS 5-YEAR ESTIMATE

53,580
NUMBER OF FLOOD INSURANCE POLICIES IN FORCE

KEEPING CAPE MAY SAFE: Your Risk MAP Timeline

YOU ARE HERE*

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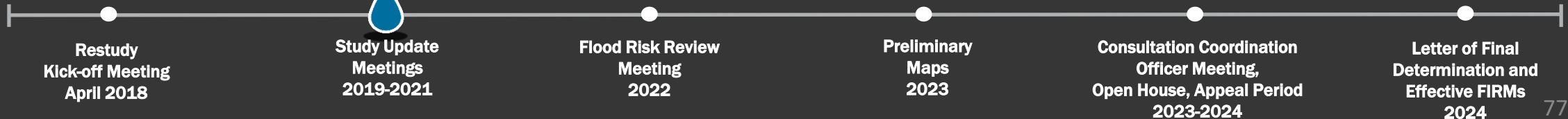
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		Melissa Herlitz, AICP melissa.herlitz@mbakerintl.com	(646) 682-5558

FEMA

Questions & Discussion

Challenges, Innovation, The Way Forward